description of this shell as ordinarily understood in standard literature. Mr. Schuchert's translation, on the other hand, has :—"*Terebratula*, Klein, 1753 (Fig. 551). Genus not well known. Mesozoic or Tertiary." He merely gives a list of ill defined generic names of no value whatever, except as an index to certain special memoirs which he happens to approve.

In the Mollusca Pelecypoda, Dr. Dall must have devoted great labour to his exhaustive revision; but, from the student's point of view, it would have been much better if he had bestowed it on the correction of mistakes. In the description of *Pseudomonotis*, for example, "left valve" is copied from the original German, although even the accompanying figure must have shown the translator that it was a mistake for "right valve."

Finally, every student must know something of the common *Nautilus*. If he looks at Prof. Hyatt's description (p. 526), he will learn that it is a recent genus, and may perhaps range backwards to the Tertiary; but if he turns to Figs. 1075 and 1076, he will read that species of the genus occur in the Middle Lias and the Tithonian. Which of these two contradictory statements does Prof. Hyatt intend the unfortunate student to accept? We presume he intended to re-name the illustrations *Cenoceras*, and, like Dr. Dall, was too much occupied with the greater rearrangements to take note of the minute points on which the real value of a text-book depends. In fact, not only in this instance, but throughout Prof. Hyatt's section on Cephalopoda, the student will find hopeless confusion and receive practically no aid in plodding through the current literature of geology and palæontology. Nearly a hundred new generic names, introduced without definition, add in no small degree to the difficulties.

While, however, the elementary student, for whom the "Grundzüge" was written, will meet with disappointment when he attempts to use its English counterpart, the more advanced student engaged in original research will welcome the handsome volume which Dr. Eastman has produced. It is a valuable work of reference, which ought to find a place in every geological and biological library. We hope it will soon be followed by the second volume, containing the Vertebrata, which will make the English "Zittel" the most exhaustive and valuable treatise on palæontology in our language.

INADEQUACY OF THE CELL-THEORY.

Les Êtres Vivants. Organisation—Evolution. By Paul Busquet. Pp. 181; 141 figures. (Paris: Carré and Naud, 1899.)

WHAT the particular secret of this volume is, we have been unable to discover, except that it is intended as an argument for a franker recognition of the unity of the organism, and as an argument against the view which regards the multicellular creature as a "cell-state" or as a colony. To discuss these difficult matters profitably requires great competence, and we do not think that this is shown by the author, who, for instance, cites the old report that the ectoderm of a Hydra turned inside out becomes endoderm, and so on, and uses this as an argument against the original distinctiveness of the two germinal layers. Furthermore, while an attack on a position often means progress, one must master the previous moves, and we see no evidence that Dr. Busquet has done so. Has he seriously considered, for instance, Whitman's notable essay on "The Inadequacy of the Cell-Theory of Development"?

A pleasing feature of the book is the author's grateful tribute to his master, Prof. Kunstler, whose views he expounds and elaborates. Thus he begins with a defence of Kunstler's conclusion that protoplasm is composed of series of minute elements, more or less globular, either placed in apposition or separated by fluid. This alveolar or "spherular" structure of protoplasm was described by Kunstler in 1881, and has been familiarised by the researches of Bütschli (not Butschli, as the author persistently calls him, just as he calls Kölliker -Kolliker, which is absurd). We do not notice any mention of Flemming, though his lifelong observations on reticular structure, and his criticism of the demonstrations of alveolar structure, must be taken account of if one wishes to be treated seriously in discussing such matters.

The author points out that just as Dutrochet (1824) and Turpin (1826) may be said to have priority over Schwann and Schleiden in formulating the "Cell-Theory," so Kunstler must be credited with priority over Sedgwick, Whitman and Delage in demonstrating its inadequacy. For Kunstler maintained long ago that the cell is no primitive morphological unit, but an acquired mode of organisation, and that the cellular structure of the Metazoa is a secondary result adaptive to functional convenience. The frequent vagueness of cell-limits, the abundant illustrations of inter-cellular bridges, and the occurrence of indisputable syncytia are forcibly indicated by the author.

It is argued that to think of a Metazoon as derivable from a colony of Protozoa is misleading; and that although there are some true colonies among Metazoa, *e.g.* in Cœlenterates and Tunicates, the colonial or polyzoic hypothesis, especially elaborated by Perrier, is a specious fallacy. We are asked to choose between two alternatives—the Metazoa are colonies of individualities of a lower order, or they are individualised irreducible unities. But it is not made plain why we may not suppose that the ancestral forms of various stocks passed through an imperfectly integrated colonial or polyzoic stage.

The author takes a survey of the animal kingdom, and seeks to substantiate a number of general conclusions, which we shall try to summarise. Living matter shows "a general and universal tendency to proliferation or repetition of similar parts." "These phenomena of repetition appear at first in the adult, where they constitute an acquired character; in the embryo they are but the reproduction more or less modified, by coenogeny, of what exists in the perfect individual." But in certain circumstances the repeated parts may coalesce, exhibiting a secondary and acquired simplification, and bringing about a recondensation of the organism, preparatory to a recommencement of the evolutionary process on some new line. Types do not arise by a slow and direct transformation of pre-existing forms, but each is a new

genesis. "The law of the formation of new types is a fragmentation of the tissue of more primitive organisms, and the arrangement of these new formations in new groups." "Neither selection nor adaptation can explain the specific peculiarities (particularités) of the structure of organisms, which are due to new spontaneous productions."

Thus the reader is insidiously led from harmless admissions as to the structure of protoplasm to grave heresies in regard to the efficacy of natural selection; but if he is convinced, we confess our inability to understand how the trick is done. We think that the sound part of the book may be summed up in a sentence of E.B. Wilson's: "Broadly viewed, therefore, the life of the multicellular organism is to be conceived as a whole; and the apparent composite character, which it may exhibit, is owing to a secondary distribution of its energies among local centres of action." J. A. T.

OUR BOOK SHELF.

Notions de Minéralogie. Par A. F. Renard et F. Stöber. Ier. fascicule. Pp. iv + 189; 398 figures. (Ghent: Ad. Hoste, 1900.)

A TEXT-BOOK of mineralogy, written by the Abbé Renard, with the co-operation of his assistant, F. Stöber, who has published important mineralogical papers, excites high expectations; and, in spite of its modest title, this work is really a text-book. The present volume contains only the introductory portion, dealing with the geometrical, physical and chemical properties of minerals. A second part is promised, which will contain the description of various species and a notice of those found in Belgium.

The excellent historical survey with which the book opens is modelled upon Fletcher's well-known "Introduction to the Study of Minerals"; it is only brought down to the year 1833. In the following section (geometrical crystallography) some of the principal types of crystals, and their planes of symmetry, are indicated by projections of the "elementary spaces" (the systematic triangles of Maskelyne) similar to those used by Liebisch in his "Grundriss der Krystallographie"; axes of symmetry are not employed, but the familiar conception of hemihedrism is retained; and the facts are stated in a manner which involves no special mathematical knowledge. Indices are used throughout. The subject of twinning is briefly treated, and only by reference to twin planes. In the optical section use is made of the wave-surface and the ellipsoid of optical elasticity.

Since out of 189 pages eighty-eight are devoted to the geometry, and fifty-seven to the physics, of crystals, the chemical section is very brief, but considerable attention is, as might be expected, devoted to microchemical analysis, and also to crystal etching.

The reader will not expect to find much that is novel; neither will this book give him an insight into modern theoretical aspects of the subject; but he will find, what is more important, a very lucid statement of the essential facts, and a clear description of the practical methods in use by mineralogists; to illustrate this, special attention may be called to the paragraph on the angle of minimum deviation on p. 116, and to the interpretation of interference figures by the diagrams on pp. 138-9

It must not be imagined from what has been said that the book ignores new advances in the science; there is, for example, a paragraph on the use of X-rays.

The figures are adequate, but not very well printed.

When the second part appears, we shall expect to find that it completes a very readable and useful student's handbook. H. A. M.

Muret-Sander's Encyclopaedic English-German and German-English Dictionary. Pp. xlviii + 1733. (London: H. Grevel and Co., 1900.)

BEFORE buying a dictionary of words of a foreign language the purchaser has to make up his or her mind as to what *kind* of a dictionary is required. There are, for instance, dictionaries which can easily be placed in the waistcoat pocket: these necessarily contain a very restricted number of words. From this they gradually increase in size, weight, and quantity of information given, until they assume such proportions that they are best kept in one place and referred to there, as their bulk renders them somewhat inconvenient to move.

The volume before us, which is described as an abridged edition, may be said to be verging on the larger size of dictionaries, as its dimensions are 11 × 8 × 3 inches, and it contains nearly 1800 pages.

The plan and arrangement of the work are uniform with the well-known French-German dictionary of Sachs-Villatte, and the pronunciation adopted is based on the phonetic system employed in the method of Toussaint-Langenscheidt.

The volume should find special favour with students of science, for, although it is in no sense technical, there is a sufficient sprinkling of scientific terms throughout its pages which should render it most useful to this large class of readers. To find out the extent of the insertion of technical terms, we have chosen at random some chemical terms such as ozone, hydroxide, vanadium, fractionation, nitrate, and find that all except one are included. Repeating the same for physical terms, we find ampere, watt, electrolysis (absent, but electrolyse inserted), galvanism, achromatic, all but one mentioned.

Some readers may dislike the use of the German type when German words are printed, since most of the German scientific publications are now printed in Roman type; any one, on the other hand, familiar with the German language, will probably prefer the usual German letters. In addition to being clearly printed, the volume is strongly bound, and is issued at the moderate price of fourteen shillings.

Die Elemente der Entwickelungslehre des Menschen und der Wirbelthiere. By O. Hertwig. Pp. vi + 406; 332 figures. (Jena: Gustav Fischer, 1900.)

THIS work is a condensation of the sixth edition of Hertwig's well-known "Lehrbuch," brought out in a form more suited to the needs of beginners and students, especially of medicine. It is intended "to serve as an introduction to the field of embryological science, and to put forward only its leading facts in a shorter form." Hence the discussion of controversial problems is omitted, as well as historical reviews or references to literature, for which the more advanced student must consult the larger work. Each chapter concludes with a "repetitorium," by which is meant a numbered series of categorical statements, summing up briefly the results obtained in the foregoing chapter. There are numerous illustrations, the pick of those in the "Lehrbuch." The book is doubtless one which will be very useful to the German student, but unless it is translated, it may be doubted if it will have a very large sale in this country, since the English student of the class for which it is intended is not able, as a rule, to read easily books in a foreign tongue, while those who take their science enough in earnest to acquire this faculty, will probably purchase the larger work. For the teacher, however, the book offers a brief and convenient summary, very handy for reference. E. A. M.